DOT/FAA/AR-00/56

Office of Aviation Research
Washington, D.C. 20591

Vertical Drop Test of a Narrow-Body Transport Fuselage Section With a Conformable Auxiliary Fuel Tank Onboard

Allan Abromowitz
Timothy G. Smith
Dr. Tong Vu

September 2000

Final Report

U.S. Department of Transportation
Federal Aviation Administration

NOTICE

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/AR-00/56		

4. Title and Subtitle	5. Report Date
VERTICAL DROP TEST OF A NARROW-BODY TRANSPORT FUSELAGE SECTION WITH A CONFORMABLE AUXILIARY FUEL TANK ONBOARD	September 2000
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Allan Abramowitz, Timothy G. Smith, and Dr. Tong Vu	

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Federal Aviation Administration Airframe Structures Section, AAR-431 William J. Hughes Technical Center Atlantic City International Airport, NJ 08405	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation Federal Aviation Administration Office of Aviation Research Washington, DC 20591	Final Report July 1999-July 2000
	14. Sponsoring Agency Code ANM-100

15. Supplementary Notes

The FAA William J. Hughes Technical Center Crashworthiness Project Manager was Gary Frings

16. Abstract

A narrow-body transport airplane fuselage section was subjected to a vertical impact drop test at the Federal Aviation Administration (FAA) William J. Hughes Technical Center located at the Atlantic City International Airport, New Jersey. The objective of the test was to determine the interaction between a typical transport airplane fuselage, particularly its floor structure, and a conformable auxiliary fuel tank under severe, but survivable, impact conditions. The fuel tank used in this test is representative of tanks being installed in narrow-body transport airplanes. A 10-foot airframe section from a Boeing 737-200 airplane was dropped from a height of 14 feet, generating a vertical impact velocity of 30 ft/sec. The airframe test section, at a weight of 8780 pounds, simulated the load density at the maximum takeoff weight condition. The weight included cabin seats, dummy occupants, and simulated fuel in the 500-gallon fuel tank. Structural response data were obtained during the impact from instrumentation installed on the fuselage structure, floor structure, and the fuel tank.

The fuselage test section sustained severe damage after the test. Portions of the cabin floor were damaged due to the impact with the auxiliary fuel tank located in the cargo compartment. The bottom of the fuel tank was punctured in numerous locations resulting in fuel spillage. The strength and rigidity of the fuel tank limited the inherent ability of the fuselage structure to absorb energy crushing during the impact.

17. Key Words	18. Distribution Statement
Crash testing, Vertical impact, Drop test, Auxiliary fuel tank, Dynamic testing, Acceleration, Airplane	This document is available to the public through the National Technical Information Service (NTIS) Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	147	